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13 April 1958

MEMORANDUM FOR RECORD

SUBJECT: Personal Equipment Staff Visit to Edwards and Del Rio AFB

25X1A 1. Personnel



The P. E. personnel strength is adequate to provide occasional short duration loan of a technician to satisfy field requirements.

Pilots--Pilot morale appeared to be good. Confidence in the present P. E. staff was reflected as quite acceptable. The only source of disgruntled dissatisfaction was in the assumptions that the project had overlooked efforts to improve their personal equipment and that the SAC, FOG pilots were provided with equipment vastly superior to theirs. A visit to SAC, FOG at Del Rio revealed that the personal equipment in use there is not superior to project equipment. Specific topics that had instilled dissatisfaction were discussed with the pilots. Personal equipment improvements of the past, the present and the future contemplated projects to improve such equipment were discussed to their satisfaction. Many of these projects are outlined in the following paragraphs.

2. Physical Plant of P. E. Section

The P. E. pre-breathing, equipment maintenance and storage areas to date have been lacking in space, convenience and comfort. A project to rehabilitate these facilities was begun on 31 March 1958. All work is to be accomplished by base A. I. O.

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### 3. Seat Ejection

All project aircraft are to be modified with ejection seats (Hot Seat). Seat installation is to be accomplished in the field. Weight penalty of the hot seat is fifty-three pounds. Hot seat and present type seat (cold seat) will be interchangeable in each aircraft. A minimum of two seat packs compatible with the hot seat will accompany the first hot seat consigned to each field organization. Additional hot seats will be accompanied by one new type seat pack.

The hot seat in its present form meets all requirements for safe successful assisted aircraft evacuation. The seat, however, lacks the feature of automatic shoulder harness lock for crash landing and ditching. Also, the present sequence of events after activating the seat firing mechanism is such that the shoulder harness locks simultaneously with firing. It is believed desirable to have the harness rewind and lock prior to firing. These points have been discussed with LAC engineers without actual authorization to incorporate these two features in project seats. A compulsory pilot familiarization and hot seat check out program will need be pursued prior to seat utilization in field.

### 4. Dual Oxygen System for Aircraft

The "Hi Alt Oxygen System and Pilots' Equipment" paper dated 14 February 1958 submitted by WRSP IV pilots to Hq reference Emergency Aircraft Oxygen system was discussed and found to lack certain features necessary for a functional emergency oxygen system. Several improvements were brought out during the discussion and determination was made to restudy and resubmit. Modification of the aircraft oxygen system to incorporate a separate emergency supply is considered imperative by the pilots.

### 5. Seat Pack for Ejection Seat

All efforts in seat pack design for project use must be directed towards a singular configuration for all units. This aspect of course is but supplementary to safety, comfort and survival requirements already outlined in discussions and specifications dating to project inception.

The new seat pack will be of smaller dimensions than the presently used seat pack due to smaller dimensions of the seat pack well in the ejection seat. This will require the local manufacture of a light wood or metal positioning device for the new seat pack whenever it is used in the old (cold) seat. Seats, cold or hot,

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are to be interchangeable in each project assigned aircraft. The quantity of survival gear to be carried in the new seat pack will be less than previously carried in the old seat pack.

All hoses protruding from seat pack will do so from the left rear corner. This will necessitate repositioning of the oxygen regulator from placement presently recommended in the F.O.G. new seat pack design. Regulator from placement is to be in the rear left corner with the emergency O<sub>2</sub> cylinder against rear wall of seat pack. The press to test will be positioned at the left front corner of the pack midline between top and bottom of hard pan and as close to the corner as engineering practices will permit.

The present type aero tech quick disconnect and hose connections will continue to be used. The ship mounted female aero tech quick disconnect is to remain unchanged in position and type.

Acceptance of the new seat pack will not require modification of any component system of the aircraft. LAC engineers have subjected the components of the old seat pack to ground test ejections. All reports have indicated adequacy and success.

An automatic method to activate the O<sub>2</sub> supply at time of ejection has not yet been devised to work in conjunction with the cockpit left console ship mounted aero tech quick disconnect. In the interim period awaiting this capability, the pilot will be required to manually activate the emergency supply prior to ejection. The emergency supply will not meter oxygen until ejection is accomplished regardless of what time the emergency O<sub>2</sub> supply is alerted prior to ejection. This is a desirable feature.

The new seat pan is reported to lack comfort. The discomfort has been considered serious enough to be noted in the aircraft discrepancy log by the majority of pilots having used the pan in excess of 2 hour periods. The P.E. section of WRSP-4 will determine the exact shortcomings relative to comfort and pursue improvements through attempts in tilting seat pack assembly, cushions, or if necessary redesign of seat pan.

One seat pack will be modified through joint efforts of LAC and WRSP-4 P.E. personnel to incorporate two each type F 2400 O<sub>2</sub> regulators enjoined to a manual regulator selector. Selections will permit activation of #1 or #2 or both regulators. It has long been the contention of the pilots that a single O<sub>2</sub> regulator to serve for both normal and emergency O<sub>2</sub> purposes to be short of desirability. It is understood that this modification will provide

psychological assurance to the pilots and possibly other benefits. It is also understood that the modification of coupling two oxygen regulators is but an R & D effort for 1 seat pack at this time. Weight penalty is calculated at between 30 to 40 ounces.

The new seat pack will be equipped with standard hooks for attaching to B-5 parachute, 1 inch medium density foam rubber pad, extending 1/2 inch forward of seat pack front edge, cloth covered with pad to seat snaps and seat pack anti flail bailout harness.

The survival equipment pouch is to be of the present design.

6. New Type Pressure Helmet (Bill Jack Helmet)

Three Bill Jack pressure helmets are to be made available for field evaluation at WRSP IV. If this helmet proves to be an improvement over the present project helmet, a number adequate to equip all project pilots will be obtained. It had been reported that the FOG pilots at Del Rio were equipped with this helmet. The trip to Del Rio disproved this. However, Del Rio has submitted a requisition for one Bill Jack helmet per assigned pilot. Inspection of the one prototype Bill Jack helmet at Del Rio reveals additional weight, absence of emergency electrical face heat, positioning of the exhalation valve in the area of perspiration accumulation and perspiration absorbing material for crash padding.

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7. Exhalation Valve

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The three exhalation valve malfunctions experienced by [REDACTED] were due as follows:

1. Diaphragm rupture due to ozone deterioration.
2. Replacement diaphragm of improper type.
3. Same as #2.

The manufacturer upon our request has developed a silicone diaphragm which is ozone deterioration immune. [REDACTED] has a supply of these silicone diaphragm exhalation valves on hand adequate to satisfy all project needs. These valves will not be released until the Aero-Medical Lab at Wright Field completes extensive tests paralleling flight conditions. Test should be completed by mid-April.

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To preclude installation of improper type exhalation valve diaphragm, the field units have been advised to return malfunctioning valves to depot rather than attempting field repair.

8. Pre-Breathing Time

Reported violations of our contract pilots decreasing the two hour pre-breathing period recommended by Lovelace Clinic were unfounded. The Del Rio pilots observe the two hour period as recommended. However, it is understood that the LAC pilots are modifying this time requirement. The two hour period must be observed prior to high flights whenever project pilots or project equipment is involved.

9. Pressure Suit Deterioration (Armpit Area)

Pressure suits at WRSP IV and Del Rio were inspected for deterioration at armpit area. Though there were no signs of rot, many of the suits showed signs of thread weave slippage in that area. The problem is not of a severity requiring immediate repair. The manufacturer has been familiarized with this problem and research is underway.

10. Bladder Incident

1. Bladder was visually inspected by P. E. techs prior shipment to Plattsburg.

2. All prescribed test procedures on helmet pressure test rig were performed.

3. P. E. Techs report that they did not observe any signs of deterioration on visual inspection and that pressure test results at 150 MM Hg with soap test revealed negative leaks.

CONCLUSION:

1. All prescribed pre-flight test procedures were performed in full to the satisfaction of fully qualified P. E. personnel. There are no indications of compromise in prescribed testing procedures. There are no indications of laxity in interest, knowledge or safety factors.

2. Though no information is available on the in-service time of helmet bladder cover assembly, it is known that this equipment was put in service by "A" camp personnel while overseas at some time during 1957.

3. The only possible guilt that can be attributed to the P. E. personnel is the disregard of suspicion. The bladder has been in service for a period in excess of the time that many of like bladders provide serviceability.

RECOMMENDATIONS:

1. Because the leak sites were located in areas not readily accessible to visual inspection and due to the failure of the test procedures

to indicate leaks and deterioration, it is requested that the bladders be removed from the helmet frame for scrutiny every 4 months or 40 hours. (These are maximum times and the lesser figure is applicable.)

2. That a flight time, installation date, pre-flight test results and repair log be maintained on this equipment.

3. That the least indication or even suspicion of malfunction of any of the pilots personal equipment will require removal from service for repair, exchange and possible U.R. or return to manufacturer with info to headquarters.

This information has been passed on to Air Force.

12. Seat Pack Strap Take Up Buckle.

Manufacturer installed seat pack strap take up buckles are positioned such as to possibly hook onto cockpit accessories during bail out. It is recommended that these clamps be turned 180 degrees maintaining clamp hook in top position.

13. Seat Pack Pelican Quick Release Clamp.

This item reported to be in use at Del Rio actually was only used a few times and discarded. None will be secured for project use due to pilot inability to operate quick release with gloves on.

14. Pulsating Seat.

The pneumatic pulsating seat for pilot comfort is not adaptable to the U-2. The pulsating seat requires a ship mounted actuating valve assembly and lines from a pressurized air source. Space and weight problems are prohibitive.

15. Hearing Loss.

The Lovelace Clinic physical examination reports dated January 1958 on [REDACTED] revealed hearing loss both ears in the middle tone ranges. [REDACTED] has been fitted with ear defenders to afford ground noise protection. The hearing loss is not limiting to his flying duties.

16. Glare Shield.

The face piece glare shield device installed on [REDACTED] helmet prior to departing Germany for New York was not fully evaluated on that flight. Due to the sun's position aft of aircraft pilot elected to

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remove shield shortly after take off. Glare shields have been provided to EAFB and "B" pilots. If proven successful, this item will be made standard equipment for project pilots and specifications will be provided to Air Force.

17. Equipment Longevity Tables

Items of personal equipment constructed of materials subject to deterioration have been categorized into a table outlining periodic inspections, type of inspection and maximum service life.\* This table is being published for project and FOG distribution.

18. Lost Equipment

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Spare pressure suits for [REDACTED] and [REDACTED] of EAFB transferred from Germany in late 1957 have never been located. Manufacture of pressure suits for each of these individuals has been approved. The Clark Co. is presently fulfilling this request.

19. Flying Boots

The modified Air Police type flying boot issued to project pilots has never been fully acceptable. Consequently most of the pilots have purchased their personal choice of flying boot and have been reimbursed for this expense. The few pilots at EAFB still wearing the modified Air Police boot are desirous of being provided with a more comfortable and warmer type. Air Force supply has such a boot for jet flyers. The stock number is being secured as well as the shoe sizes of the EAFB pilots desiring this boot. Distribution will be well in advance of the next cold weather season.

20. Cold Weather Gloves (Ground Wear)

In anticipation of cold weather operations, the pilots have asked to be provided with mittens for ground wear. The survival kits issued to all P. E. sections at the onset of the program contained wool and leather mittens above and beyond survival requirements. Hq will not purchase additional gloves or mittens unless a specific request is received from the Personal Equipment Officers. An ample supply of mittens according to Hq supply documents is on hand at each camp.

21. Oxygen Connectors for Pressure Suit and Seat Pack

The engineering of the oxygen hose connectors leaves much to be desired. Because of the possibility of improper hook-up conceivably leading to inadvertent disconnect in flight, a safety lock

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spring clip has been designed to decrease this possibility. These spring clips offer but partial security against disconnect and in addition offer the undesireabilities of hook-up complications plus near impossibility for the pilot to disconnect himself in an emergency such as in water survival. The connector manufacturer will be encouraged to redesign this equipment based on more realistic considerations as well as recommendations accumulated from the EAFB and Del Rio pilots and P.E. personnel. Tentative designs have already been drawn.

22. Discrepancies In Breathing Hose Electrical Wires.

Several reports have been received from field units on electrical shorts in the face heat and communications wires imbedded in the molded rubber of the face piece breathing hose. Investigation showed the cause of this problem to be due to the breakdown of the brittle nylon wire insulation. The manufacturer has been familiarized with this difficulty and a new insulation called "Teflon" will now be used exclusively for insulation. "Teflon" is reported to be impervious to cold and heat and capable of maintaining flexibility under all flight conditions.

23. Facial Perspiration.

Excessive perspiration in the areas of face and head has not been reported during flight. This problem appears to be one which predominates between the time the pilot vacates the air conditioned pre-breathing room until after take off. Attempts to control perspiration through the use of styptic astringent compounds have proved unsuccessful. The only true solution apparent in this case is in utilizing an air conditioned vehicle to transfer the pilot to the cockpit. Shading the cockpit from the sun prior and during hook-up on hot days is essential as well. EAFB has recently equipped a pilot transfer vehicle with air conditioning facilities. All field units operating in warm climate should be provided with this type of vehicle.

24. In Flight Feeding.

The present face piece incorporates an orifice to permit in flight feeding without necessitating face piece removal. Due to poor design resulting in oxygen leakage, most flight feeding orifices have had to be cemented shut. Though the majority of our pilots have not indicated any particular desire to eat during flight it is still essential that some functional in-flight feeding device be developed. Even though the present in-flight feeding orifice could be repaired leak free, there is still the conflict of microphone positioning in line between

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mouth and orifice. Food availability as well as suitable food dispensers and collapsible or pressurized containers are other items deterrent to present day flight feeding. This entire program will need to be restudied. The Dave Clark Co. has researched this endeavor for several years. It will be necessary to express our present dissatisfactions to them in an effort to accelerate progress in this field.

25. Oxygen Regulator Factory Representatives

The F2400 oxygen regulator manufactured by the Firewell Co. is the only oxygen regulator being used in the U-2. Each project camp has been assigned a Tech Rep to maintain this equipment and only that individual has been authorized full familiarity and repair privileges. The regulator is rapidly becoming the most widely used oxygen regulator in high altitude AF aircraft. The complexity of the item is not such as to warrant the assignment of a factory representative to each AF base utilizing it. Though it is recommended that the project continues to employ Firewell Tech Reps, it is felt that some consideration should be given to training AF personnel and Physiological Training airmen in its maintenance. The F2400 regulator could ably be covered in the P. E. and P. T. curriculums at Gunter AFB.

26. Ventilated Suit

The EAFB pilots had requested that the ventilated suits reported in use at Del Rio be studied for possible acceptance by project. Del Rio has two types of ventilated suits. One type is built into the partial pressure suit and is used exclusively by their B-57 pilots. The other type is a perforated plastic outer garment which can be worn by the U-2 pilot during transfer from the pre-breathing room to the cockpit. The purpose of the suit is to provide comfortable temperature environment. With the advent of the air conditioned transfer vehicle or operations in cool climates, the outer garment ventilated suit will be of no value. In the absence of an air conditioned transfer vehicle or aircraft air conditioning malfunction in flight, the ventilation modified partial pressure suit could be of value. To realize this benefit would require extensive modification of project pressure suits or purchase of new ones as well as modification of the aircraft to facilitate conditioned air piping to the suit.

  
Aviation Physiologist

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